

001834

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
21 October 2004 (21.10.2004)

PCT

(10) International Publication Number  
**WO 2004/089512 A1**

(51) International Patent Classification<sup>7</sup>: **B01D 53/14,**  
53/62, 53/86

(74) Agent: **BARRETT, Michael, C.;** Fulbright & Jaworski,  
L.L.P., Suite 2400, 600 Congress Avenue, Austin, TX  
78701 (US).

(21) International Application Number:  
**PCT/US2004/009962**

(81) Designated States (*unless otherwise indicated, for every  
kind of national protection available*): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 1 April 2004 (01.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/460,532 4 April 2003 (04.04.2003) US

(84) Designated States (*unless otherwise indicated, for every  
kind of regional protection available*): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-  
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,  
GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,  
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG).

(63) Related by continuation (CON) or continuation-in-part  
(CIP) to earlier application:  
US 60/460,532 (CIP)  
Filed on 4 April 2003 (04.04.2003)

(71) Applicant (*for all designated States except US*): **THE  
UNIVERSITY OF TEXAS SYSTEM** [US/US]; Board  
Of Regents, 201 W. 7th Street, Austin, TX 78701 (US).

**Published:**

- with international search report
- before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **ROCHELLE,**  
Gary [US/US]; 10103 Vaquero Trail \_\_\_\_\_,  
Austin, TX 78759 \_\_\_\_\_ (US). **CULLI-**  
**NANE, John** [US/US]; 2801 Wells Branch, Apt. #1334,  
Austin, TX 78728 (US).

*For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.*

(54) Title: **POLYAMINE/ALKALI SALT BLENDS FOR CARBON DIOXIDE REMOVAL FROM GAS STREAMS**

(57) Abstract: Novel solvents and methods of use for the removal of CO<sub>2</sub> from flue gas, natural gas, hydrogen gas, synthesis gas, and other process and waste gas streams are provided. The solvent contains an alkali salt such as potassium carbonate and a polyamine such as piperazine (PZ) where the polyamine concentration is at least 1.5 equivalents/Kg H<sub>2</sub>O and the alkali salt concentration is at least 0.5 equivalents/Kg H<sub>2</sub>O. The preferred alkali salt/polyamine ratio is from approximately 1:2 to 2:1, and no additional alcohol is required for solubilizing the PZ. This chemical solvent and method of use provides efficient and effective removal of CO<sub>2</sub> from gaseous streams and other sources.

WO 2004/089512 A1